

WHAT IS CLAIMED IS:

1. A photodiode comprising:
a substrate;
5 a buffer layer and a light-absorbing layer laminated in sequence on the substrate;
an epitaxial layer having an active region shaped in a convex lens formed on an
upper surface of the light absorbing layer;
a dielectric layer formed on an upper surface of the epitaxial layer;
a first metal electrode formed on an upper surface of the dielectric layer; and,
10 a second metal electrode formed on an under surface of the substrate.
2. The photodiode according to claim 1, wherein said epitaxial layer is formed
from InP.
- 15 3. The photodiode according to claim 1, wherein the buffer layer
comprises same crystal structure as the substrate.
4. The photodiode according to claim 1, wherein the active region of the
epitaxial layer defines a light-receiving area.
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5. The photodiode according to claim 1, wherein the first metal electrode
comprises a P-metal electrode.

6. The photodiode according to claim 1, wherein the second metal electrode comprises an N-metal electrode.

7. A method for manufacturing a photodiode, the method comprising the steps
5 of:

forming a buffer layer, a light-absorbing layer, and an epitaxial layer in sequence on a substrate;

selectively etching the epitaxial layer of an active region to form a convex-lens-shape surface;

10 forming a dielectric layer on an upper surface of the epitaxial layer excluding the active region;

performing a diffusion process using the dielectric layer as a diffusion mask to form a diffusion layer on the active region of the convex-lens-shape surface;

forming a first metal electrode on an upper surface of the dielectric layer; and,

15 forming a second metal electrode on an under surface of the substrate.

8. The method according to claim 7, wherein the etching step comprises the steps of:

applying a photosensitive film on the upper surface of the epitaxial layer and

20 forming a photosensitive mask pattern on the upper surface of the epitaxial layer excluding the active region for a subsequent light exposure; and,

wet etching the epitaxial layer in a lens-forming etching solution.

9. The method according to claim 8, wherein the epitaxial layer is formed from InP.

10. The method according to claim 8, wherein the lens-forming etching solution
5 is methanol bromide.

11. The method according to claim 7, wherein the step of forming a diffusion layer on the active region in a convex-lens shape is performed in more than two steps by dividing the diffusion area into more than one separate area.

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12. The method according to claim 7, wherein the buffer layer, light-absorbing layer, and epitaxial layer are deposited by metallo-organic chemical-vapor deposition.

13. A photodiode manufactured according to the steps cited in claim 7.

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14. The method according to claim 7, wherein the diffusion layer is formed on the active region of the convex-lens shape surface by a Zn diffusion process.